

(No Model.)

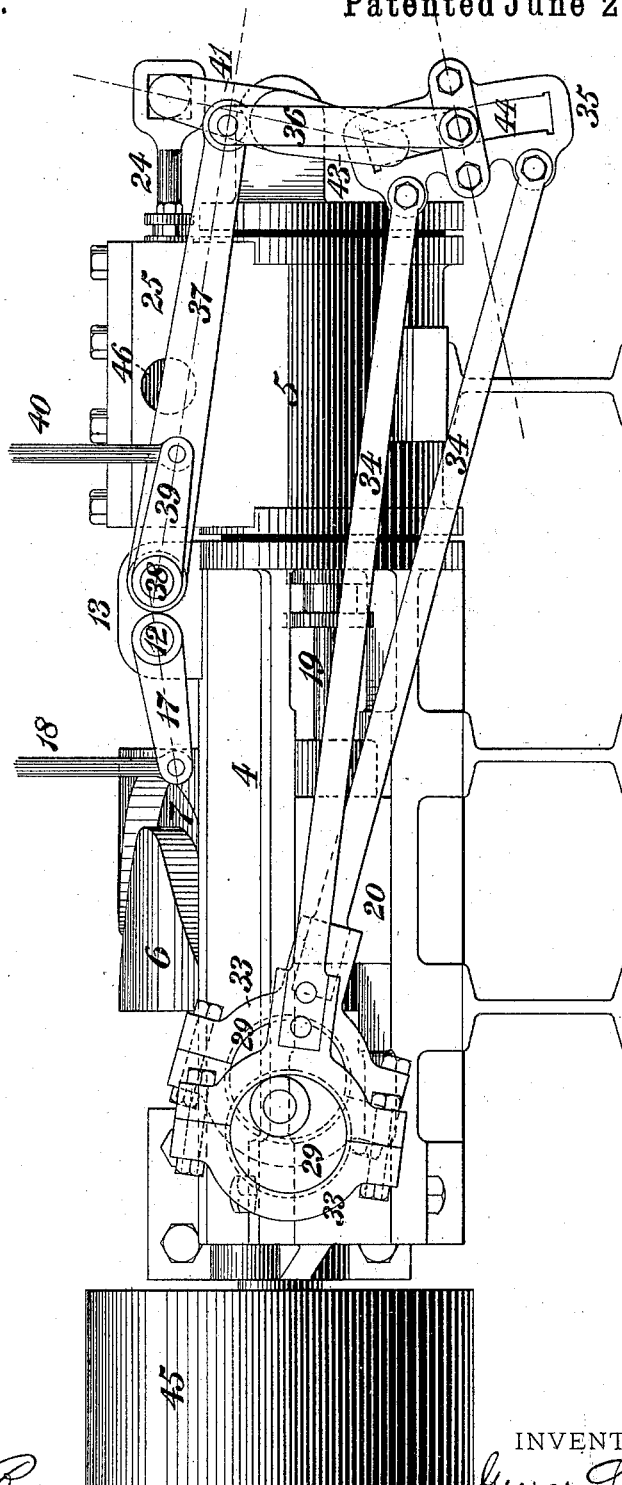
3 Sheets—Sheet 1.

G. L. PEABODY.
STEAM ENGINE.

No. 344,593.

Patented June 29, 1886.

Fig. 1.



WITNESSES:

J. Thorden Bell
E. M. Clarke

INVENTOR,

George L. Peabody
BY *George H. Christy*
ATTORNEY

(No Model.)

3 Sheets—Sheet 2.

G. L. PEABODY.
STEAM ENGINE.

No. 344,593.

Patented June 29, 1886.

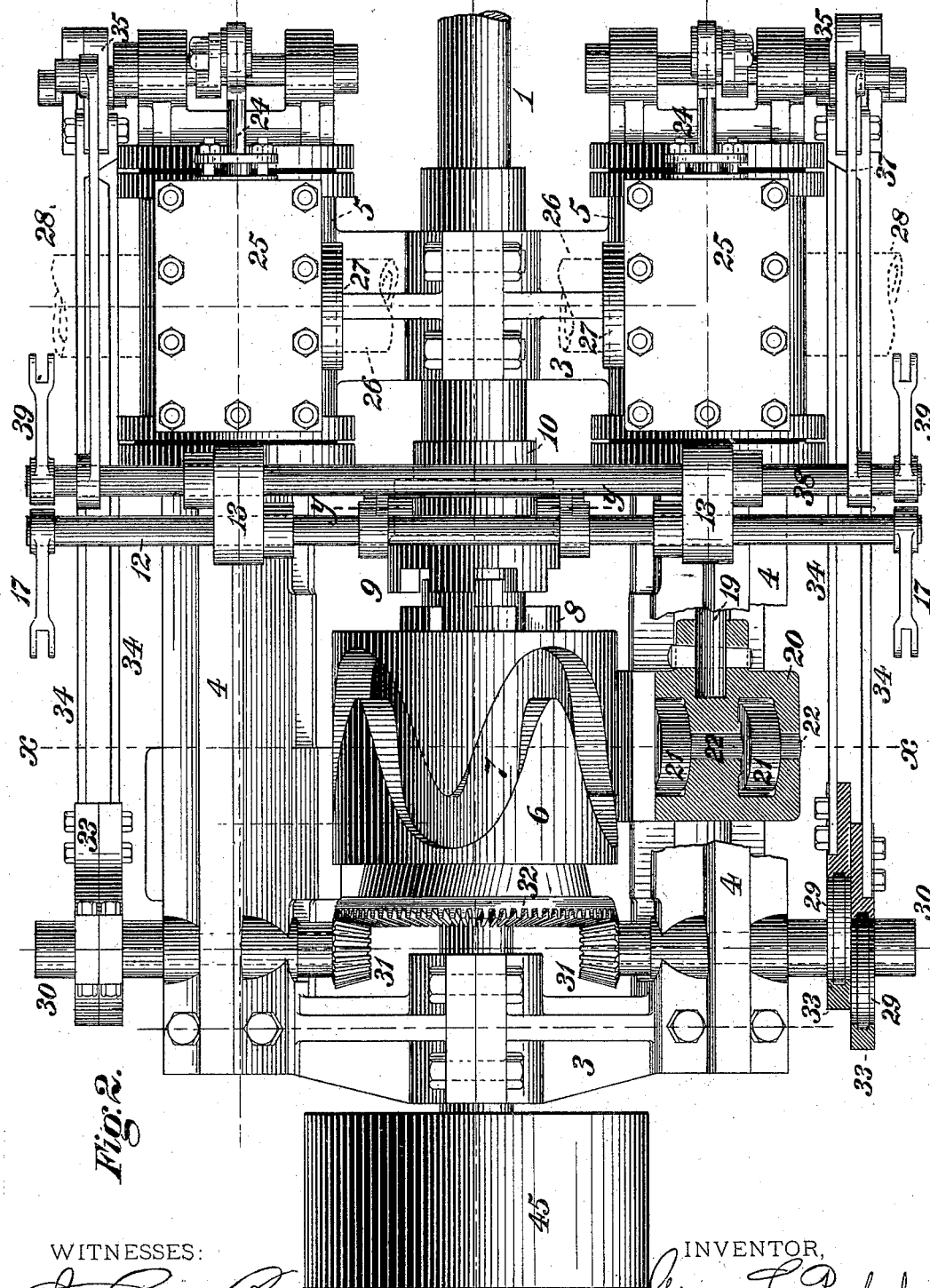


Fig. 2.

WITNESSES:

J. Thomson Bell.
E. M. Clarke

INVENTOR,

George L. Peabody.
BY *George H. Christy*
ATTORNEY.

(No Model.)

3 Sheets—Sheet 3.

G. L. PEABODY.
STEAM ENGINE.

No. 344,593.

Patented June 29, 1886.

Fig. 4.

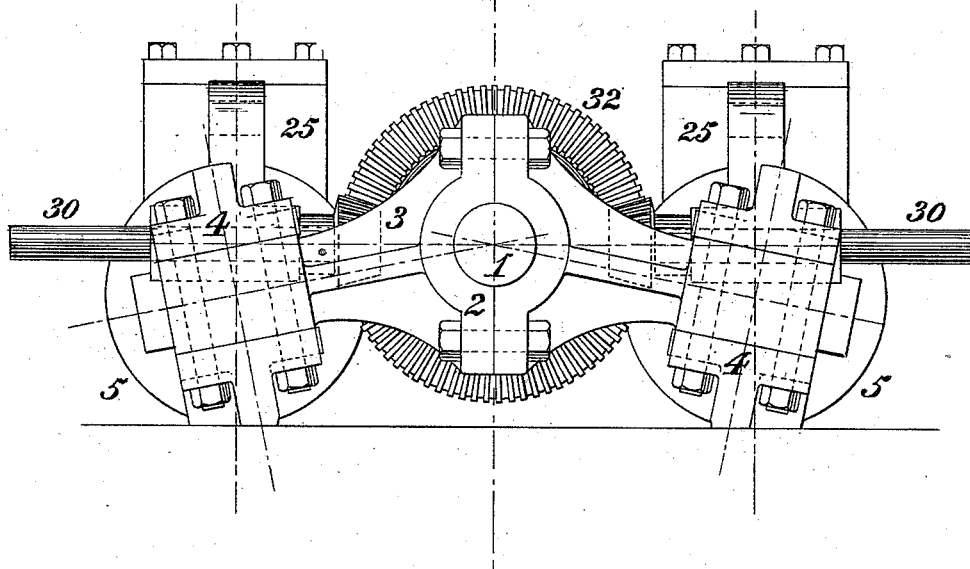


Fig. 3.

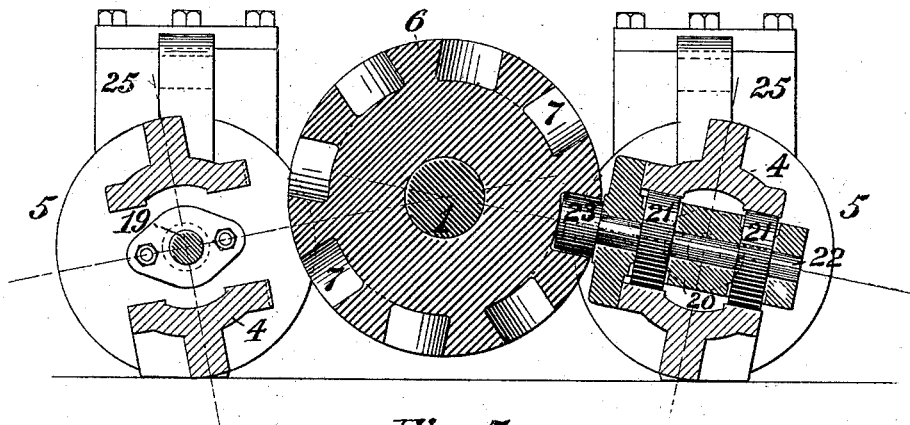
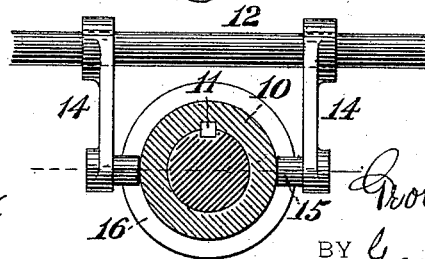


Fig. 5.



WITNESSES:

John W. Bell
L. M. Clarke

INVENTOR,

George L. Peabody

BY *George H. Christy*
ATTORNEY.

UNITED STATES PATENT OFFICE.

GEORGE L. PEABODY, OF PITTSBURG, PENNSYLVANIA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 344,593, dated June 29, 1886.

Application filed January 11, 1886. Serial No. 188,198. (No model.)

To all whom it may concern:

Be it known that I, GEORGE L. PEABODY, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Steam-Engines, of which improvements the following is a specification.

In the accompanying drawings, which make part of this specification, Figure 1 is a side view, in elevation, of a steam-engine embodying my invention; Fig. 2, a plan or top view, partly in section, of the same; Fig. 3, a vertical transverse section at the line *xx* of Fig. 2; Fig. 4, an end view in elevation, and Fig. 5 a vertical transverse section through the main shaft clutch-coupling at the line *yy* of Fig. 2.

The object of my invention is to provide a simple, compact, and inexpensive steam-engine in which the objectionable action of crank movements shall be avoided, and which shall be specially applicable to use where economy of space is of material importance—as, for example, in the propulsion of street-cars, small boats, &c.

The improvements claimed are hereinafter fully set forth.

In the practice of my invention I provide a main or driving shaft, 1, through which the power exerted by the engine is applied to the performance of the work required, said shaft being mounted and adapted to rotate freely in suitable bearings, 2, formed on the transverse members 3 of a supporting-frame composed of said transverse members, of two pairs of cross-head guides, 4, and of two steam-cylinders, 5, each of which is connected at one end to a pair of guides, 4, and which are connected one to the other by one or more of the transverse frame-pieces 3. It will be obvious that the transverse members may be connected to the guides at or near the cylinder ends thereof, instead of to the cylinders; but I deem the construction shown to be preferable, as preventing overhang of the cylinders, and imparting greater stability to the structure. A drum or cylinder, 6, is mounted in the shaft 1, said drum having in its periphery a continuous circumferential groove, 7, which is curved for equal distances and on similar lines of curva-

ture in alternately-reversed directions in the manner of a helix having an alternate right and left hand lead.

The drum 6 may be either fixed upon the driving-shaft 1, or, preferably, as in the instance shown, be mounted loosely thereon and provided with jaws 8 on one of its ends adapted to engage similar jaws, 9, on a clutch-coupling, 10, which is fitted to slide longitudinally on a key or feather, 11, on the driving-shaft, and is moved into and out of gear with the drum by a clutch-shaft, 12, mounted in bearings 13 on the guides, and having arms 14, provided with pins 15, which enter a circumferential groove, 16, in the clutch-coupling. The clutch-shaft is rocked in its bearings, to effect the movement of the clutch-coupling by arms 17 on one or both of its ends, which arms may be connected by rods 18 with hand-levers located in any convenient position, or may be manipulated directly, as found most convenient.

Each of the steam-cylinders 5 is fitted with a properly-packed piston of any suitable construction, the piston-rod 19 of which passes through a stuffing-box in the head of the cylinder nearest the guides, and is secured to a cross-head, 20, fitted to slide between the same, said cross-head being either babbitted or fitted with adjustable gibs, or, as shown, bearing thereon by friction-rollers 21, journaled upon a stem, 22, fixed in the cross-head. The roller-stems 22 of the two cross-heads are inclined at equal angles to a plane passing through the axes of the cylinders 5, and the axes of the stems intersect in the axial line of the driving-shaft 1, as shown by the dotted lines in Fig. 3. Each of the stems 22 projects beyond the cross-head in which it is fitted toward the drum 6, and enters the groove of the same for a distance substantially equal to the depth thereof, and said stems carry, mounted freely on their projecting ends, friction-rollers 23, the diameter of which is substantially equal to or slightly less than the width of the drum-groove 7, and their length about equal to its depth. The friction-rollers 23 are thus adapted to bear against either side of the groove 7, the length of each separate helical curve of which, meas-

ured on its center line, is equal to the length of stroke of the pistons of the steam-cylinders 5. It will be seen that by reason of the alternately-reversed direction of said helical curves 5 the backward and forward movements of the pistons of the cylinders 5 and their cross-heads 20 will impart a continuous movement of rotation in one or the other direction (according as the steam-distribution valves may be moved) to the drum 6, and to the main shaft 1, when the drum is engaged therewith by the clutch-coupling, as before described. The axes of the bearings of the cross-heads on the drum—*i. e.*, the rollers 23—being inclined one 15 to the other, the pistons of the two steam-cylinders work at a determined fraction of their stroke apart—preferably half-stroke—so that when one piston is at the end the other is at the middle of its stroke, and there will consequently be no dead-points, as would be the case if both pistons simultaneously changed their direction of movement.

The admission and exhaust of steam to and from each of the cylinders 5 is effected by a proper steam-distribution valve of any approved type, either slide or piston, said valves being secured to valve-stems 24, and fitted to reciprocate in steam-chests 25, located above the cylinders 5 and communicating therewith 30 by the usual steam and exhaust ports. Steam is supplied to the steam-chests 25 through steam-pipes 26, connected to openings or nozzles 27 on the chests, and is exhausted therefrom after performing its work in the cylinders through exhaust-pipes 28, connected to exhaust-openings 46.

Each of the distribution-valves is reciprocated by an eccentric, 29, said eccentric being fixed (either singly when the engine is required to run in one direction only, or in pairs when its movement requires to be reversed from time to time) upon a pair of eccentric shafts, 30, which are mounted in bearings on the guides 4 and carry bevel-pinions 31, meshing with a similar gear, 32, fixed upon the main shaft 1. In the instance illustrated the engine is adapted to be reversed, and to this end two eccentrics, 29, are fixed upon each eccentric-shaft 30, one of the eccentrics of each shaft being properly set for forward and the other for back motion. The eccentric-straps 33 of each pair of eccentrics are secured to eccentric-rods 34, the opposite ends of which are coupled to links 35, which are suspended by hangers 36 from arms 37 on a reversing shaft, 38, mounted in bearings on the guides 4, and provided with reversing-arms 39 on one or both of its ends, which arms may either be manipulated directly by the engineer, or be coupled by rods 40 to hand-levers located in any desired position.

The valve-stems 24 are coupled to arms 41 on rock-shafts 42, having arms 43 on the opposite sides of their axes, which are journaled in blocks fitting in the slots 44 of the links, the link-motion corresponding in all essential

particulars with those employed in locomotive and marine engines of well-known types.

A driving-pulley, 45, or a coupling-section may be secured upon the main shaft 1 for the transmission of power to machinery to be driven; or, in the case of a car or locomotive the driving-wheels may be either fixed upon said shaft or upon a separate shaft driven by proper gearing therefrom, as may be deemed most advisable. The entire mechanism being suspended upon the driving-shaft, its normal relation thereto will be maintained under any and all changes of position of the latter.

I am aware that reciprocating driving-members working in spiral grooves on a shaft or drum have been heretofore known as a means for converting rectilinear into rotary motion, and am also aware that a pair of steam-cylinders located parallel to and on opposite sides of the axial line of an interposed driving-shaft, and having driving-members connected to their piston-rods and engaging a spiral groove on the driving-shaft was known prior to my invention. Such constructions therefore, broadly, I hereby disclaim.

I claim herein as my invention—

1. The combination of two steam-cylinders, each having a pair of cross-head guides fixed to one of its ends, transverse frame-pieces connecting the opposite cylinders and guides at or near each end of the engine, a driving-shaft mounted in bearings in said transverse frame-pieces, a drum mounted on said driving-shaft, and having a circumferential groove of alternately-reversed direction, and a pair of cross-heads, each working in one of the pairs of guides and fixed to the piston-rod of one of the steam-cylinders, said cross-heads having projecting members engaging the groove of the drum, substantially as set forth.

2. The combination of a driving-shaft, a drum mounted freely thereon, and having a circumferential groove of alternately reversed direction, a clutch-coupling fitted on a key or feather on said shaft, and having projections adapted to engage similar projections on the drum, a shaft and arms serving to move said clutch-coupling into and out of engagement with the drum, and a pair of steam-cylinders located parallel to the driving-shaft, and having projecting members upon the cross-heads of their piston-rods engaging the groove of the drum, substantially as set forth.

3. The combination of a frame composed of two pairs of cross-head guides, each fixed to a steam-cylinder and connected by transverse members, a driving-shaft mounted in bearings in said transverse members, a drum mounted on said driving-shaft, and having a circumferential groove of alternately-reversed direction, a pair of cross-heads, each working in one of the pairs of guides and fixed to the piston-rod of one of the steam-cylinders, said cross-heads having projecting members engaging the groove of the drum, a pair of eccentric-shafts, each rotated by gearing from

the driving-shaft, two pairs of eccentrics, each pair fixed upon one of the eccentric-shafts, and reversing mechanism, substantially as described, whereby either eccentric of each pair
5 may be caused to actuate the distribution-valve of the corresponding cylinder, substantially as set forth.

In testimony whereof I have hereunto set my hand.

GEORGE L. PEABODY.

Witnesses:

J. SNOWDEN BELL,
R. H. WHITTLESEY.